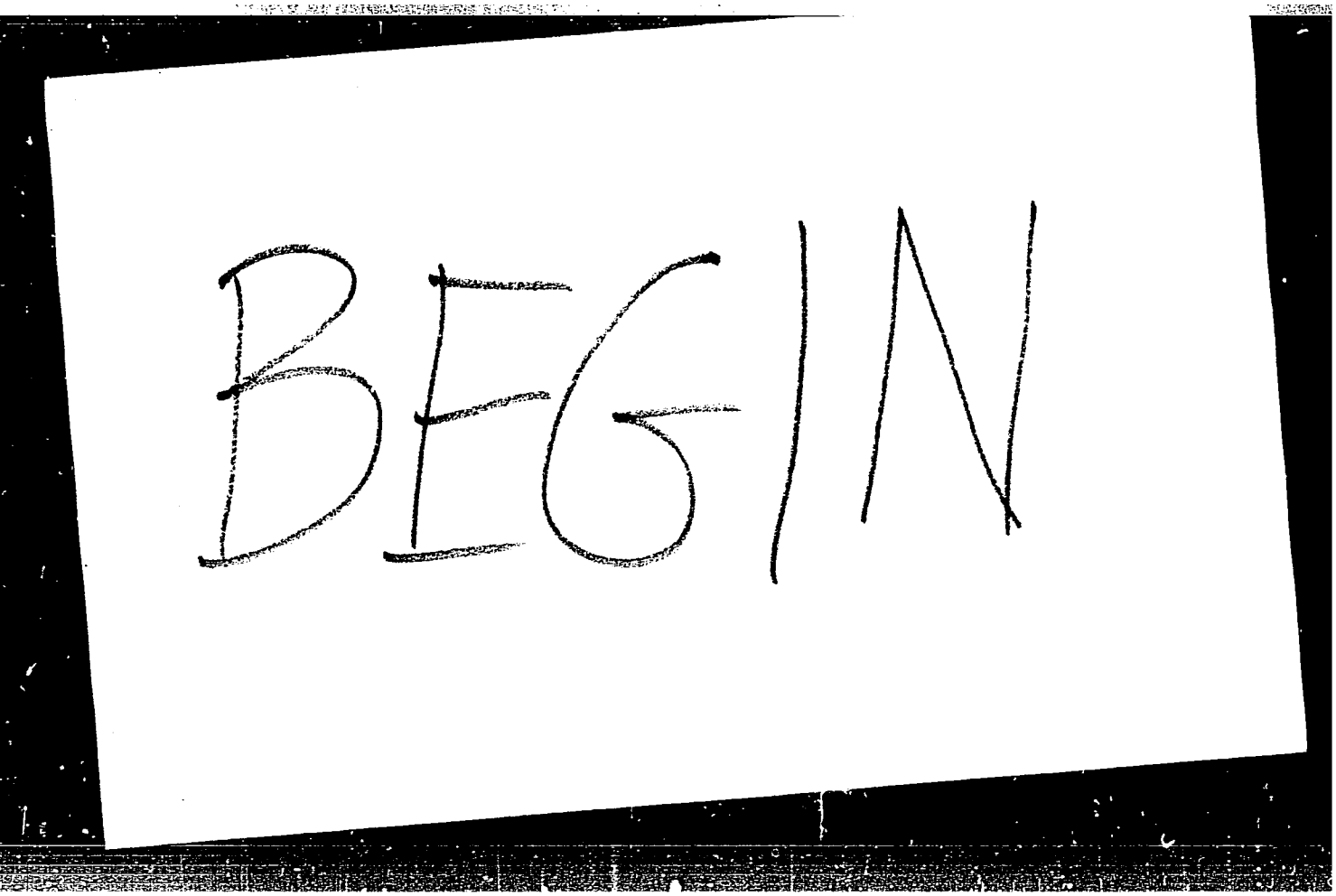
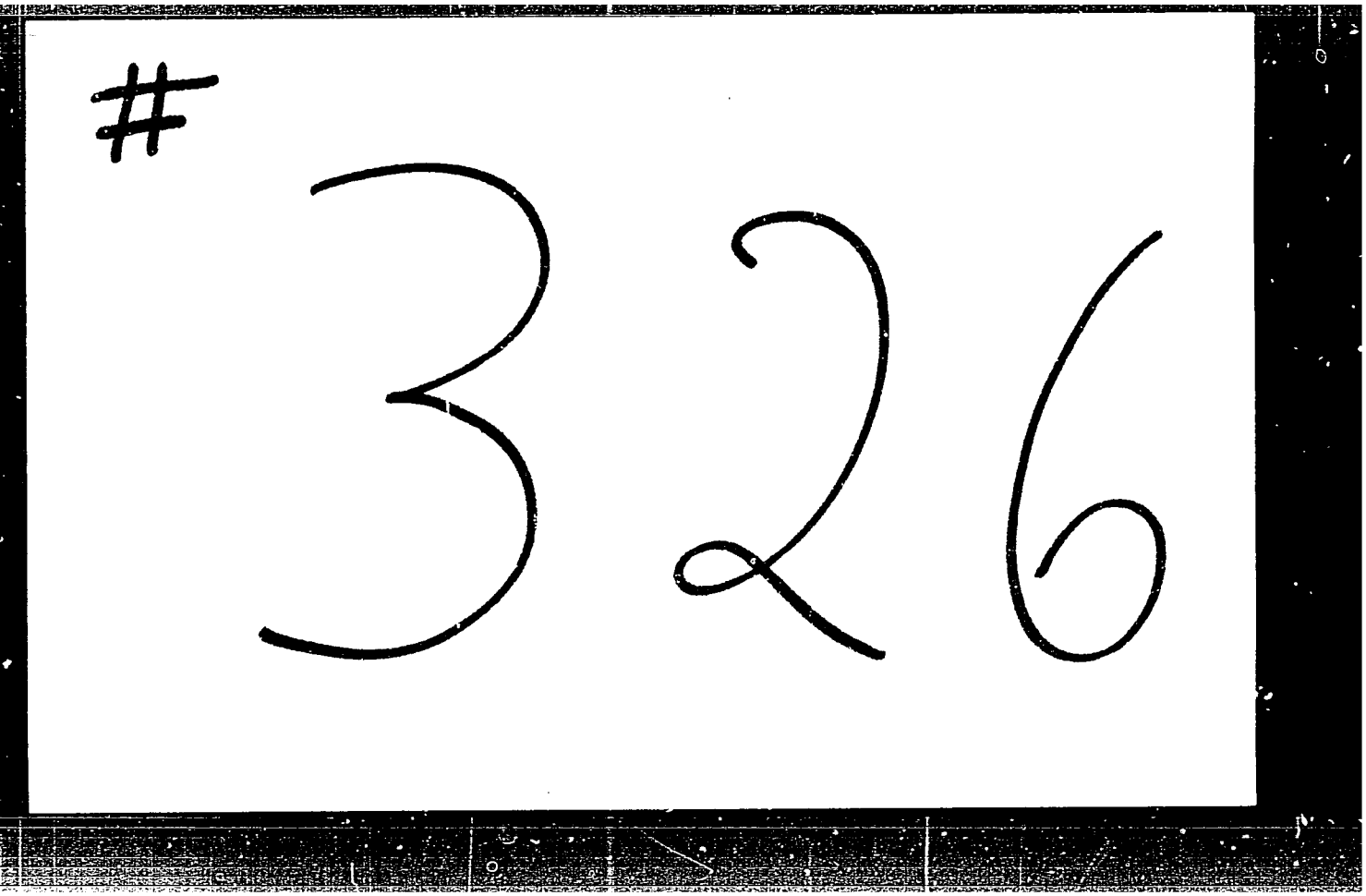


APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001031010001-4"



DYADICHENKO, D.I.; LUZHIN, B.I.

Standardizing allowances for tight metric screw threads.
Standartizatsiia 26 no.9:8-11 S '62. (MIRA 15:9)
(Screw threads, Standard)

YANUSHEVICH, A.I., otv. red.; DOLGUSHIN, I.A., zam. otv. red.; LUZHIN, B.L., red.; PALIY, V.F., red.; AYZIN, B.M., red.; VOZHEYKO, I.V., red.; SUVOROVA,R.I., red.; RORORKINA,Z.P., tekhn.red.

[Animal acclimatization in the U.S.S.R.] Akklimatizatsiia zhivotnykh v SSSR; materialy. Alma-Ata, Izd-vo Akad. nauk Kazakhskoi SSR, 1963. 369 p. (MIRA 16:7)

1. Konferentsiya po akklimatizatsii zhivotnykh v SSSR, Frunze, 1963. 2. Institut zoologii AN Kirg.SSR (for Yanushevich, Ayzin, Paliy).

(Acclimatization)

LUZHIN, B.

"Acclimatization of the Sevan Trout (Salmo Ischcha , Infra Species Gergerkuni Kessler) in Lake Issyk-Kul',"

SO: Dok. AN, 59, No. 3, 1948. Lab. Ichthyol. and Hydrobiol., Kirgiz Affiliate, Acad. Sci. c1948-.

LUZHIN, B.P.

Issyk-Kul gudgeon Gobio gobio latus Anikin (Cyprinidae, Pisces).
Trudy Biol.inst.KirFAN SSSR no.3:123-132 '50. (MLRA 8:5)
(ISSYK-KUL--GOBIES)

LUZHIN, B.P.

Results of acclimatizing the gegarkun trout (Salmo ischchan infraspecies gegarkuni Kessler) in Lake Issyk Kul. Trudy Biol. inst. KirFAN SSSR no.4:197-215 '51. (MLRA 9:10)
(ISSYK KUL, LAKE--TROUT)

LUZHIN, B. P.

"Acclimatization of Cevan Gegarkun Trout in Lake Issyk-Kul'." Cand Biol Sci, Kirgiz Agricultural Inst, Frunze, 1953. (RZhBiol, No 8, Dec 54)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (12)
SO: Sum. No. 556, 24 Jun 55

LUZHIN, B.P.

Feeding habits of the gegarkuni trout of Lake Issyk-Kul' (Salmo ischchan issykogegarkuni Lushin). Trudy Inst. zool. i paraz. KirFAN SSSR. no.1:79-86 '54. (MLRA 10:6)
(Issyk-Kul', Lake--Trout) (Fishes--Food)

LUZHIN, B.P.

Materials on the biology of the young of gegarkuni trout and its reproduction in the tributaries of Lake Issyk-Kul'. Trudy Inst. zool. i paraz. KirFAN SSSR, no.1:87-97 '54. (MLRA 10:6)
(Issyk-Kul' region--Trout)

Luzhin, B. P.

TURDAKOV, F.A.; LUZHIN, B.P.

Systematic position of Schizothorax issykkuli typ. Berg and Schizothorax issykkuli tschuensis ssp. n. of Lake Issyk-Kul' and the Chu River. Trudy Inst. zool. i paraz. KirFAN SSSR. no.1:123-129 '54. (MLRA 10:6)
(Issyk-Kul', Lake--Carp) (Chu River--Carp)

LUZHIN, B.P.

TRUDAKOV, F.A.; LUZHIN, B.P.

Fishes of the Aksay River (Tarim basin). Trudy Inst. zool. i paraz. KirFAN SSSR no.2:57-65 '54. (MLRA 10:6)
(Aksay River--Carp)

LUZHIN, B.P.; BARAMZIN, N.A.

Materials on the systematics of the Amu Darya trout from the basin of the Kyzyl-su River (Alai Valley, Pamirs). Trudy Inst.zool.i paraz.AN Kir.SSR no.4:7-11 '55. (MLRA 10:5)
(Kyzyl-Su Valley--Trout)

LUZHIN, B.P.

[Gegarkuni trout of Lake Issyk-kul] Issykkul'skaia forel' gegarkuni. (Salmo ischchan issykogegarkuni Lushin) Frunze, Izd-vo Akademii nauk Kirgizskoi SSR, 1956. 132 p. (MIRA 11:6)
(Issyk-kul, Lake--Trout)

Luzhin, B.P.

TURDAKOV, F.A.; LUZHIN, B.P.; BARAMZIN, N.A.

Incubating fish eggs in a continuous and intermittant stream of running water. Trudy Inst. zool. i paraz. AN Kir. SSR no.6:3-20 '57. (MIRA 11:3)

(Fish culture)

LUZHIN, B.P.

[redacted] (Agama himalayana Steind.) from the Alay Valley (Pamir). Veterinariia 34 no.5:61-63 My '57. (MIRA 10:6)
(Alay Valley--Lizards)

LUZHIN, B.P.; STOYANOVA, L.I.

Age and growth rate of Schizothorax isykkuli Berg, Diptychus dybowskii landselli Gunther, and Leuciscus bergi Kaschkarov in Lake Issyk-Kul'. Izv.AN Kir.SSR Ser.biol.nauk 1 no.4:111-124 '59. (MIRA 13:7)
(Issyk-Kul'--Carp)

LUZHIN, B.P.

Materials on the acclimatization of pike perch in Lake Issyk-Kul'. Izv.AN Kir.SSR Ser.biol.nauk 1 no.4:147-151 '59. (MIRA 13:7)
(Issyk-Kul'--Perch)

TURDAKOV, F.A.; LUZHIN, B.P.; BARANZIN, N.A.

Incubation of Diptychus roe in Weiss and Williamson apparatus.
Trudy Inst.zool.i paraz.AN Kir.SSR no.7:97-107 '59.
(MIRA 13:4)

(Fish culture) (Perch)

LUZHIN, B.P.

Material on the growth of young gegarkuni trout from Lake Issyk-Kul'. Trudy Inst.zool.i paraz.AN Kir.SSR no.7:293-297 '59.
(MIRA 13:4)

(Trout)

LUZHIN, B.P.; BARANZIN, N.A.

Significance of running water for the inoculation of eggs of the gegarkuni trout. Izv. AN Kir. SSR. Ser. biol. nauk 3 no.1:115-124 '61. (MIRA 14:12)

(ISSYK-KUL'--TROUT) (FISH CULTURE)

SOV/124-58-2-2113

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 2, p 87 (USSR)

AUTHORS: Bezukhov, N. I., Luzhin, O. V.

TITLE: On the Calculation of Thin-walled Beams With Respect to Forced Vibrations (K raschetu tonkostennykh sterzhney na vynuzhdennyye kolebaniya)

PERIODICAL: V sb.: Issledovaniya po teorii sooruzheniy. Nr 7, Moscow, Gosstroyizdat, 1957, pp 7-41

ABSTRACT: An investigation of forced vibrations of thin-walled beams. It is indicated that the influence of a constraint of nonplane deformations of the cross sections of thin-walled beams becomes greater with dynamic loadings than with static loads. An examination is made of the forced torsional vibrations of thin-walled beams with two axes of symmetry. The flexural vibrations of such beams are expressed by the same equations that are well known from the theory of the vibrations of nonthin-walled beams. The equations of torsional vibrations are then described by a single differential equation. In the solution of that equation the authors utilize the method of initial parameters for which in this paper the authors provide definitive

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On the Calculation of Thin-walled Beams With Respect to Forced Vibrations

formulas for any generic section and a table of the amplitudes of the vibrational reactions for several specific cases of the attachment of such beams. As an example the authors examine an H beam, at the center of the span of which a concentrated torque is applied. It is found that the constraint of the nonplane deformations reduces the second-order moment at midspan by more than one half, while the torque at the supports is reduced by 30 percent. For the purpose of comparison the paper also adduces distribution curves relative to the amplitudes obtained in the calculations of the same H beam conducted for it as a nonthin-walled beam. Thereupon the study continues with an examination of the free torsional vibrations of thin-walled beams having sections with two axes of symmetry. In that case the value of the external disturbance must be equalled to zero in the equations of the torsional vibration forces, while the frequency of the forced vibrations should be replaced by the natural frequency. For an H beam of the Nr 30a type the first natural frequency was found to be 2.5 times as great as when the same profile was considered as a nonthin-walled beam. At this point the authors adduce some experimental data, namely, the results of an experimental investigation of a Nr 18 H beam, one end of which was free, while the other end was tightly welded to a special plate. The difference between test data and theoretical values amounted to only 4-5 percent. Further on the authors discuss the forced

SOV/124-58-2-2113

On the Calculation of Thin-walled Beams With Respect to Forced Vibrations

flexo-torsional vibrations of thin-walled beams having a section with but a single axis of symmetry. The corresponding formulas and amplitude tables for the initial parameters, in this case, were found to be more complicated. As a result of a comparison of the distribution curves of the force and kinematic factors for a thin-walled beam (viz., a Nr 16a channel beam) one may note that when the beam is acted upon by a concentrated force and a torque moment of equal magnitude the torsional factors are considerably smaller for a vibrating concentrated force than for a torque moment vibrating with the same frequency, and, conversely, the flexural factors in the second case are small as compared to those obtaining in the first case. Consideration is given to the influence of concentrated masses on the amplitudes of a forced vibration and to the case of the presence of a longitudinal force due to an elastic and an elastic-moment foundation. Lastly, the authors discuss the peculiarities of the dynamic calculation of composite beams made up of thin-walled elements, in particular of beams with a discontinuous axis. The paper introduces the concept of a "dynamic center of stiffness", which is characterized by the property that a dynamic transverse load passing through it does not exert any torque upon the beam.

D. V. Bychkov

Card 3/3

LUZHIN, O.V., dots., kand.tekhn.nauk

Calculating deformations of prismatic rods subjected to elastic-plastic diagonal and longitudinal-lateral bending. Nauch.dokl. vys.shkoly; stroi. no.2:63-70 '58. (MIRA 12:1)
(Elastic rods and wires)

LUZHIN, O.V. (Moskva)

Determining the frequency of free torsional vibrations in thin-walled rods. Stroi.mekh.i rasch.soor. 1 no.6:43-46 '59. (MIRA 13:4)
(Elastic rods and wires--Vibration)

LUZHIN, .O.V., kand. tekhn. nauk, dots. (Moskva)

Determining the natural-vibration frequency in thin-walled rods with closed and open profiles. Issl. po teor. sooruzh. no.8:27-36 '59. (MIRA 12:12)
(Elastic rods and wires--Vibration)

29753
S/194/61/000/006/012/077
D201/D302

24.4200

AUTHOR: Luzhin, O.V.

TITLE: Electric simulation of thin-walled closed profile stems

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 6, 1961, 38, abstract 6 B278 (Tr. 1-y Mezhvuz. nauchno-tekhn. Konferentsii po elektr. modelirovaniyu zadach stroit. mekhan., soprotivleniya materialov i teorii uprugosti. B.m., Novocherk. politekhn. in-t, 1960, 148-154)

TEXT: Limitations are established of analogues in the design of open and closed profiles (P) and it is shown that all design formulae, determining the displacements and stresses in the theory of open P, may be obtained from the theory of closed P, provided a coefficient of deplanation $\mu = 1$ and the directional moment of inertia $I_i = \infty$ are assumed, i.e. if the non-displacement condition

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Electric simulation...

is imposed onto the stem. The principles are laid down of simulating the formulae of the method of initial parameters, with the help of which the following problems of structural mechanics can be solved: Longitudinal and transverse longitudinal bending, bending of beams on elastic foundations, constrained twisting of open and closed P, bending of casings, the dynamics of bent beams, thin walled stems subjected to torsion etc. The analogy between the properties of el. network and the elastic system of thin-walled stems of closed P is indicated. 3 figures. 13 references. [Abstracter's note: Complete translation]

Card 2/2

LUZHIN, O.V.

"Analog methods: computation and simulation" [in English] by W.J.Karplus, W.W.Soroka. Reviewed by O.V.Luzhin. Stroi. mekh.i rasch.soor. 2 no.3:3 of cover '60. (MIRA 13:6)

(Electronic differential analyzers)
(Electromechanical analogies)
(Karplus, W.J.) (Soroka, W.W.)

69407

S/144/60/000/04/002/017
E194/E455

16,6800

AUTHOR: Luzhin, O.V., Dotsent

TITLE: The Analogue Representation of a Continuous Beam on Elastic Supports

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Elektromekhanika, 1960, Nr 4, pp 11-16 (USSR)

ABSTRACT: The object of this article is the analogue representation of a continuous beam on elastic supports, it being assumed for simplicity that the spans are equal and the supports of equal rigidity. The method adopted avoids the need to convert from the case of elastic supports to that of rigid supports by a process of successive approximations but requires some modernization of the computer type EMSS-1. The design of the beam on elastic supports reduces to a system of equations of five moments given by Eq (2). Minor variations are introduced according to whether the load is distributed or concentrated. Considering the electrical circuit shown in Fig 2, which is formulated from quadripoles, Eq (5) may be written for the current in a particular loop of the circuit and the equation for the five currents may

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The Analogue Representation of a Continuous Beam on Elastic Supports

be obtained in the form of Eq (6). Eq (2) and (6) are then compared and the conditions of correspondence are given by Eq (7). Modifications in the equivalent circuit that are required in particular cases to avoid the presence of negative resistances, which are very inconvenient in d.c. analogues, are then explained. The circuit representing a four-span continuous beam on elastic supports for a particular case is shown in Fig 7. Analogues have also been formulated for continuous beams of elastic supports with unequal spans. The case of supports of varying rigidity has also been examined but the present article omits details and gives only the final conditions of correspondence. The circuits presented here may be used to solve some dynamic as well as static problems. An appendix gives a numerical example of a particular case. There are 7 figures and 6 Soviet references.

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The Analogue Representation of a Continuous Beam on Elastic Supports

4

ASSOCIATION: Voyenno-inzhenernaya Krasnoznamennaya akademiya
(The Red Banner Military Engineering Academy)

SUBMITTED: November 30, 1959

Card 3/3

LUZHIN, O.V.

Conference on using electromechanical analogies in solving problems in structural mechanics, resistance of materials, and theory of elasticity. Stroi. mekh. i rasch. soor. 2 no. 2:3 of cover '60.
(MIRA 14:5)
(Electromechanical analogies)

LUZHIN, O.V. (Moskva)

Similarity in the theories of constrained torsion of thin-walled rods. Stroi.mekh.i rasch.soor. 2 no.4:13-14 '60. (MIRA 13:7)
(Elastic rods and wires)
(Torsion)

LUZHIN, O.V., dotsent, kand.tekhn.nauk (Moskva)

Designing beams with variable cross-sections on foundations subject to linear deformations. Issl. po teor. sooruzh. no. 9:15-25 '60. (MIRA 14:1)

(Girders)

LUZHIN, O.V.

Conference on the theory of plates and shells. Stroi. mekh. i rasch. soor. 3 no.1:52 '61. (MIRA 14:2)
(Elastic plates and shells)

LUZHIN, O.V. (Moskva)

Free oscillations in a thin sperical shell. Stroi. mekh. i rach. soor. 3 no.3:32-36 '61. (MIRA 14:6)
(Elastic plates and shells)

LUZHIN, O.V., kand.tekhn.nauk, dotsent (Moskva)

Determining vibration frequency in a momentless spherical dome.
Issl. po teor. sooruzh. no.10:3-9 '61. (MIRA 14:8)
(Elastic plates and shells--Vibration)

LUZHIN, O.V., kand.tekhn.nauk, dotsent (Moskva)

Using electric models of problems in structural mechanics giving rise to systems of five-member equations. Issl. po teor. sooruzh. no.10:270-278 '61. (MIRA 14:8)
(Structural frames--Electromechanical analogies)
(Linear equations)

LUZHIN, O.V.

Conference on the use of electric models to study the problems of structural mechanics, resistance of materials, and the theory of elasticity. Stroi. mekh. i rasch. soor. 4 no.2:47 '62. (MIRA 15:5)

(Structures, Theory of--Electromechanical analogies)

LUZHIN, O.V., kand.tekhn.nauk, dotsent (Moskva)

Axisymmetrical vibations of spherical shells at variable boundary conditions. Issl.po teor.sooruzh. no.11:35-53 '62. (MIRA 15:8)

(Elastic plates and shells--Vibration)

S/879/62/000/000/085/088
D234/D308

AUTHOR: Luzhin, O. V. (Moscow)

TITLE: Dynamical design of domes as systems with a finite number of degrees of freedom

SOURCE: Teoriya plastin i obolochek; trudy II Vsesoyuznoy konferentsii, L'vov, 15-21 sentyabrya 1961 g. Kiev, Izd-vo AN USSR, 1962, 548-551

TEXT: The author considers the determination of natural frequencies and basic forms of vibrations of domes using Love-Kirchhoff theory. It is assumed that the shells are thin and material is isotropic, and the limit of elasticity is not exceeded. He states that the solution of the problem reduces to finding values of the frequency coefficient k whose substitution into the equation

$$h^3(n+1)^3 - (k^2+4)n^2(n+1)^2 + \left(1 - \frac{k^2}{1-\mu^2}\right)c^2 n\,(n+1) -$$

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Dynamical design of ...

$$-\left[2 + \frac{(1 + 3\mu)k^2 - k^4}{1 - \mu^2}\right] c^2 = 0$$

will yield three degrees of spherical functions satisfying the boundary conditions. He also states that results obtained in this way differ considerably from those derived from the formulas of other authors, e.g. in a particular case k = 2.89, as compared with 2.31 (G. I. Rosenblat), 1.17 (O. D. Onioshvili), 1.05 (Ye. I. Oboloshvili). The application of the method of concentrated masses to the problem is mentioned. Values of k found in a numerical example by taking different numbers of degrees of freedom are compared.

Card 2/2

KEROPYAN, K.K., doktor tekhn. nauk, prof.; CHEGOLIN, P.M., kand. tekhn. nauk, dots.; LUZHIN, O.V., kand. tekhn. nauk, dots. nauchnyy red.; BORODINA, I.S., red. izd-va; BEGAK, B.A., red. izd-va; MOCHALINA, Z.S., tekhn. red.

[Use of electric models in structural mechanics] Elektricheskoe modelirovanie v stroitel'noi mekhanike. Moskva, Gosstroiizdat, 1963. 389 p. (MIRA 16:5)
(Electromechanical analogies)
(Strains and stresses)

LUZHIN, O.V., kand. tekhn. nauk, dotsent (Moskva)

Calculations for plates with a complex configuration of the edge. Issl. po teor. sooruzh. no.12:227-234 '63. (MIRA 16:6)

(Elastic plates and shells)

BEZUKHOV, Nikolay Ivanovich; LUZ"IN, Ol'gert Vladimirovich; Prinimal uchastiye KATS, M.M.; GORYACHEVA, T.V., red.; KASIMOV, D.Ya., tekhn. red.

[Stability and dynamics of structures in examples and problems] Ustoichivost' i dinamika sooruzhenii v primerakh i zadachakh. Moskva, Gosstroiizdat, 1963. 370 p. (MIRA 17:1)

LUZHIN, O.V.

All-Union conference on the theory of plates and shells. Stroi. mekh. i rasch. soor. 4 no.1:46 '62. (MIRA 16:12)

LUZHIN, O.V.

Electric modeling of bent beams of variable cross section.
Mat. mod. i elek. tsepi no.1:92-96 '63. (MIRA 16:11)

LUZHIN, O.V. (Moscow)

"Statical and dynamical analysis of bar systems, plates and shells by the method of extension of a given system".

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

LUZHIN, O.V., kand. tekhn. nauk (Moskva)

Static and dynamic calculation of beams, frames, slabs, and shells by using an "expansion" of a given system. Issl. po teor. sooruzh. no.13:63-76 '64. (MIRA 18:2)

BOLOTIN, V.V., prof., red.; RABINOVICH, I.M., prof., red.; SMIRNOV, A.F., prof., red.; LUZHIN, O.V., kand. tekhn. nauk, nauchn. red.

[Problems of stability in structural mechanics] Problemy ustoichivosti v stroitel'noi mekhanike; trudy. Moskva, Stroiizdat, 1965. 474 p. (MIRA 18:5)

1. Vsesoyuznaya konferentsiya po problemam ustoychivosti v stroitel'noy mekhanike, Moskva, 1963.

LUZHINA, E. V.

"The Improvement of Prekos Coarse Wool Crossbreeds by Crossing Them With the Tsigay Breed." Cand Agr Sci, All-Union Sci-Res Inst of Animal Husbandry, Moscow, 1953. (RZhBiol, No 2, Sep 54)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (10)

So: Sum. No. 481, 5 May 55

LUZHINSKAYA, M. G.

Mbr., Inst. Physics of Metals, Ural Affil., Acad. Sci., 1947-c49-.

"Influence of Processes of Relaxation and Recrystallization on Magnetic Properties of Iron Sillicide."

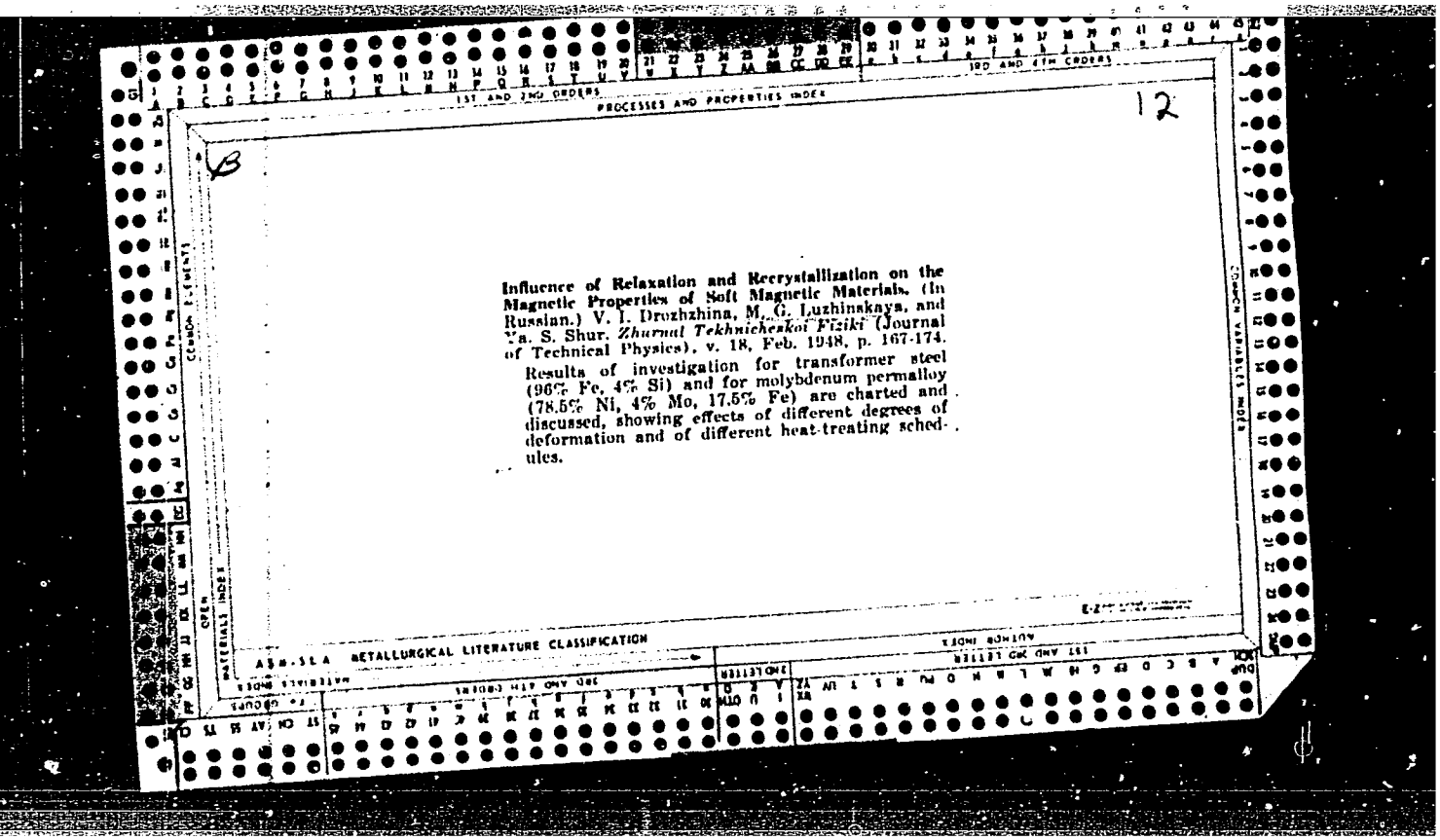
SO: Iz. Ak. Nauk SSSR, Ser. Fiz., 11, No. 6, 1947; p. 676

"Effect of Processes of Relaxation and Recrystallization on Magnetic Properties of Weakly Magnetic Materials."

SO: Zhur. Tekh. Fiz., 18, No. 2, 1948; p. 167

"The Magnetic Structure of Highly Coercive Alloys: II. Effect of Thermomagnetic Treatment on the Electric Resistance of Highly Coercive Alloys of Alnico."

SO: Zhur. Tekh. Fiz., 19, No. 1, 1949.



PROCESSES AND PROPERTIES INDEX

12

Influence of Relaxation and Recrystallization on the Magnetic Properties of Soft Magnetic Materials. (In Russian.) V. I. Druzhzhina, M. G. Luzhinskaya, and Ya. S. Shur. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Feb. 1948, p. 167-174.

Results of investigation for transformer steel (96% Fe, 4% Si) and for molybdenum permalloy (78.5% Ni, 4% Mo, 17.5% Fe) are charted and discussed, showing effects of different degrees of deformation and of different heat-treating schedules.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

USSR/Physics
Alloys, Magnetic
Thermomagnetic Effect

Jan 49

"The Magnetic Structure of Highly Coercive Alloys: II, Effect of Thermomagnetic Treatment on the Electric Resistance of Highly Coercive Alloys of Alnico," V. I. Drozhzhina, M. G. Luzhinskaya, Ya. S. Shur, Inst Phys of Metals, Ural Affiliate, Acad Sci USSR, 5 pp

PA 24/49T112

"Zhur Tekh Fiz" Vol XIX, No 1

Establishes connection between anisotrophy of the magnetic characteristics with anisotrophy in the microstructure of certain high-coercive alloys (alnico in this case), both of which arise as result of thermomagnetic processing.

24/49T112

LUZHINSKAYA, M. G.

DROZHZHINA,V.I.; LUZHINSKAYA,M.G.; MOROZOV,V.M.; SHUR,Ya.S.

Effect of magnetic texture of ferromagnetic materials on the trend in the modifications of electric resistance curves in the magnetic field. Trudy Inst. fiz. met. no.15:42-56 '55.
(Ferromagnetism) (MLRA 8:6)

LUZHINSKAYA, M.G.

17
1.4E2c

3

"The Influence of Elastic Stresses and Thermomechanical Treatment on the Magnetic Properties of High-Coercivity [Iron-Base] Alloys. Ya. I. Shur, M. G. Luzhinskaya, and L. A. Shubina (*Fiziko Metallov i Metallovedenie*, 1960, 9, (3), 467–468).—[In Russian]. A letter. Experiments on Fe-Co-W and Fe-Mn alloys show that small stresses do not change the relative proportions of ferromagnetic and non-ferromagnetic phases; their only effect is to increase the anisotropy in individual domains, i.e. to increase H_c (coercive field). At the same time small stresses improve the magnetic texture, i.e. increase B_r (remanent magnetization). Large stresses convert ferromagnetic phases into non-ferromagnetic, i.e. reduce H_c and B_r. As an example of the use of thermomech. treatment S. et al. quote the improvement of H_c from 400–450 Oe. before treatment to 600–650 Oe. after, and of $(BH)_{max.}$ from 2–3 before to 3–4 $\times 10^6$ gauss.Oe. after. The best magnets improved by this process have $H_c = 670$ Oe., $(BH)_{max.} = 4{\cdot}2 \times 10^6$ gauss.Oe. and $B_r = 10{\cdot}4$ k.gauss.
—A. F. B.

Luzhinskaya, M.G.

AUTHOR: Shur, Ya. S., Luzhinskaya, M.G. and Shubina, L.A. 108

TITLE: Influence of elastic stresses on the magnetic properties of Vicalloy. (Vliyaniye uprugikh napryazheniy na magnitnye svoystva splava vikalloy.)

PERIODICAL: "Fizika Metallov i Metallovedenie," (Physics of Metals and Metallurgy), 1957, Vol.IV, No.1 (10), pp. 54-59, (U.S.S.R.)

ABSTRACT: The influence of unilateral elastic stretching and elastic torsion on the magnetic properties of the high coercitivity Vicalloy (12% V, 52% Co, rest Fe) was investigated on wire specimens. It was experimentally established that elastic stresses have a considerable influence on the magnetic properties of Vicalloy. Elastic stretching leads to an increase of H_c to several times the original value and also to an increase of B_r. In the case of elastic torsion H_c also increases but B_r decreases. It is shown that the increase in H_c both for stretching and torsion is caused by an increase in the anisotropy of the single domain formations due to the increase of the anisotropy of the stresses. Change of the residual induction in the case of stretching is due to an increase in the longitudinal magnetic texture and in the case of torsion it is due to a weakening of the texture. The results obtained confirm that the high coercive forces of high coercive alloys are due to large magnetic anisotropies in presence of a single domain structure. 6 graphs, 3 references, 1 of which is Russian.

Institute of Metal Physics, Ural Branch of the Ac.Sc.

Recd. August 3, 1956.

LUZHINSKAYA, M.G.

SHUR, Ya.S.; LUZHINSKAYA, M.G.; SHUBINA, L.A.

Thermomechanical treatment of vicalloy. Fiz. met. i metalloved. 4 no.1:60-69 '57. (MLRA 10:6)

1. Institut fiziki metallov Ural'skogo filiala Akademii nauk SSSR.
(Vicalloy--Metallurgy)

AUTHORS: Luzhinskaya, M. G. and Shur, Ya. S. 126-2-9/30

TITLE: The effect of elastic stresses and thermo-mechanical treatment on the magnetic properties of some solid magnetic materials. (Vliyaniye uprugikh napryazheniy i termomekhanicheskoy obrabotki na magnitnye svoystva nekotorykh zhestkikh magnitnykh materialov).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), Vol.IV, No.2, 1957, pp.239-244 (USSR)

ABSTRACT: In previous papers (1 and 2) the authors have shown that elastic stress and thermo-mechanical treatment have a real effect on the magnetic properties of materials with high coercivity. Results are now reported on the effect of elastic stress, torsion, and thermo-mechanical treatment on the magnetic properties of the following alloys: (8% V, 52% Co, 40% Fe), (14% V, 52% Co, 34% Fe), and (15% Mn, 85% Fe). The thermo-mechanical treatment consisted in the application of one-sided tensile stress during tempering. Experimental details were given in earlier work (1 and 2). The effect of the above mentioned factors on the magnetic properties of the Fe-Co-V alloys, and the alloy (12% V, 52% Co, 36% Fe) which was investigated earlier, turned out to be of the same character in all the cases

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The effect of elastic stresses and thermo-mechanical treatment on the magnetic properties of some solid magnetic materials. (Cont.) 126-2-9/30

studied. Thermo-mechanical treatment has the biggest effect on the alloy containing 12% V, the effect on the alloy containing 8% V being somewhat smaller. The effect of thermo-mechanical treatment on the alloy containing 14% V is small. The changes in magnetic properties with tensile stress are also most pronounced for the 12% V alloy and not so marked for the 14% V alloy. The magnetic properties of Fe - Mn alloys as functions of thermo-mechanical treatment and elastic stress are similar to those of the Fe-Co-V alloys. The authors are led to believe that the above mentioned factors produce changes in magnetic properties of the above materials because of changes in magnetic anisotropy and structure. Similar effects are to be expected in other high coercivity materials (alloys). Thermo-mechanical treatment is thus shown to be a new method of improving the magnetic properties of high coercivity materials. There are 5 references, 2 of which are Slavic, and 8 figures.

Card 2/2

SUBMITTED: October 15, 1956.

ASSOCIATION: Institute of Metal Physics, Ural Branch, Ac.Sc., USSR. (Institut Fiziki Metallov Ural'skogo Filiala AN SSSR).

AVAILABLE:

LUZHINSKAYA, M.G.

AUTHORS: Shur, Ya. S., Luzhinskaya, M. G., Shubina, L. A. 48-9-14/26

TITLE: Note on the Influence of Elastic Stress and of a Combined Heat and Mechanical Treatment on the Magnetic Properties of Highly Coercive Alloys (Vliyaniye uprugikh napryazheniy i termomekhanicheskoy obrabotki na magnitnyye svoystva vysokokoertsitivnykh splavov).

PERIODICAL: Izvestiya AN SSSR Seriya Fizicheskaya, 1957, Vol. 21, Nr 9, pp. 1275-1279 (USSR.).

ABSTRACT: In this paper the influence of elastic stress (dilatation and torsion) and of a combined heat and mechanical treatment on the magnetic properties of some highly coercitive alloys was investigated. The combined heat and mechanical treatment consisted of imposing a dilating stress on the samples during tempering, under which conditions that crystal texture is formed, which corresponds to the highly coercitive state. It is shown, that the elastic stress and the heat and mechanical treatment have an essential influence on the magnetic properties of some highly coercitive alloys. These effects permit to increase the magnitude of H_c (coercitive force and $(BH)_{max}$ (maximum magnetic energy) of a number of alloys. For example, the value of H_c can be raised by 25 % and that of $(BH)_{max}$ by 40 % in the case of an

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48-9-14/26

Note on the Influence of Elastic Stress and of a Combined Heat and Mechanical Treatment on the Magnetic Properties of Highly Coercive Alloys.

alloy consisting of 12 % V, 52 % Co and 36 % Fe by means of a heat and mechanical treatment. In the presence of a dilatation stress the values of H_c and $(BH)_{max}$ in the same alloy can be increased manifold.

The laws obtained at the modification of the magnetic properties under the influence of elastic stress and a combined heat and mechanical treatment can be explained on the basis of the modern conception of the peculiarities of the magnetic structure of highly coercitive alloys. There are 5 figures and 5 references, 3 of which are Slavic.

ASSOCIATION: Institute for Physics of Metals of the UFAN USSR (Institut fiziki metallov UFAN SSSR.).

AVAILABLE: Library of Congress.

Card 2/2

SOV/58-59-10-22821

Translation from: Referativnyy Zhurnal, Fizika, 1959, Nr 10, p 145 (USSR)

AUTHORS: Shur, Ya.S., Luzhinskaya, M.G., Vlasov, K.B., Shiryayeva, O.I., Zaykova, V.A.

TITLE: On the Relation Between the Magnetic Properties and Sensitivity of Magnetostrictive Receivers

PERIODICAL: Tr. In-ta fiz. metallov. Ural'skiy fil. AN SSSR, 1958, Nr 20, pp 131-140

ABSTRACT: The authors made an experimental study of the relation between the sensitivity of magnetostrictive receivers and the magnetic characteristics of a number of materials out of which they were produced. For this study soft magnetic materials were used that possess very dissimilar magnetic and magnetostrictive properties. It is demonstrated that for every receiver the greatest magnitude of sensitivity is attained at those values of the magnetizing field and that magnitude of induction, at which the greatest value of the product $\mu \sim \cdot (\partial\lambda/\partial B)$ is obtained for the given material. The sensitivity of receivers made of different kinds of materials, measured at optimum polarization, is proportional to the

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SOV/58-59-10-22821

On the Relation Between the Magnetic Properties and Sensitivity of Magnetostrictive Receivers

magnitudes $\mu_{\sim} \cdot (B_{opt}) (\partial\lambda/\partial B) (B_{opt})$, $\mu_{\sim} \cdot (B_{opt}) (\lambda_s/I_s)$, or $\mu_o(\lambda_s/I_s)$ obtained on these materials. It follows that if the static magnetic characteristics μ_o, λ_s, and I_s of the materials are known, then, using the correlation $e_{max} \sim \mu_o (\lambda_s/I_s)$, it is possible to make an approximate comparative estimate of the magnitude of sensitivity of magnetostrictive receivers produced from these materials. Cf abstract 22801.

V.A. Zaykova

Card 2/2

AUTHORS: Shur, Ya. S., Luzhinskaya, M. G., SOV/48-22-10-18/23
Vlasov, K. B., Shiryayeva, O. I., Zaykova, V. A.

TITLE: On the Dependence of the Sensitivity of Magnetostrictive Receivers on Their Magnetostrictive Characteristics (O zavisimosti chuvstvitel'nosti magnitostriktsionnykh priyemnikov ot ikh magnitnykh kharakteristik)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 10, pp 1259 - 1262 (USSR)

ABSTRACT: According to theoretical calculations (Refs 1 - 3) the sensitivity of the magnetostrictive receiver can be related to the magnetic characteristics of the material of the receiver as follows:

$$e \sim \mu_{\sim} \frac{\partial \lambda}{\partial B} \qquad (1)$$

$$e_{max} \sim \mu_{\sim} (B_{opt.}) \frac{\lambda_s}{I_s} \qquad (2)$$

$$e_{max} \sim \mu_0 \frac{\lambda_s}{I_s} \qquad (3)$$

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The symbols denote: e - sensitivity, $\mu_{\sim}$ - apparent permeability, λ - magnetostriction, B - induction, λ_s - saturation magnetostriction, I_s - saturation magnetization, μ_o - initial permeability, e_{max} - maximum sensitivity of the receiver at a certain optimum value of the induction of the polarization B_{opt}. In the present paper the above-mentioned theoretical relations and their possible application in the selection of the material for magnetostrictive receivers were checked by experiment. Materials with widely differing magnetic properties were investigated. The measurements showed that after different treatment the alloys exhibited widely differing magnetic properties and sensitivities. From experimental data can be seen that in the case of a modification of the magnetic state of the concerned receiver its sensitivity varies according to formula (1). The relations (2) and (3), which relate the maximum values of the receiver sensitivity of various alloys, are satisfied less exactingly. One of the reasons for this disagreement might be errors in the experimental determination of various characteristics.

On the Dependence of the Sensitivity of Magnetostrictive Receivers on Their Magnetostrictive Characteristics

SOV/48-22-10-18/23

The results show that when formula (3) is employed an approximate comparative estimation of the sensitivity of the material can be given if the values of μ_o, λ_s, and I_s are known. Detailed results of this work are published in reference 3. There are 3 figures and 3 references, 1 of which is Soviet.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Metal Physics, AS USSR)

Card 3/3

SOV/180-59-3-22/43

AUTHORS: Averkiyev, V.S., Luzhinskaya, M.G. and Shur, L.Ya. (Sverdlovsk)

TITLE: Improving the Properties of High Coercivity Alloys by Thermal-Mechanical Treatment

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 3, pp 125-127(USSR)

ABSTRACT: It is possible to control the magnetic properties of alloys to some extent by influencing their crystalline structure. Two of the present authors have previously described a new method of improving the properties of mechanically hard alloys by the application of tension during the process of heat treatment. This method, known as thermal-mechanical treatment, has been applied to several alloys and the greatest effect was obtained with Vikaloy consisting of 12% V, 52% Co and the remainder Fe. A detailed study of the influence of heat and mechanical treatment showed that the increase in coercive force that can be achieved by this treatment is mainly associated with increasing magnetic anisotropy of the alloy whilst the increase in the remanent induction is associated with strengthening of the

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Improving the Properties of High Coercivity Alloys by Thermal-Mechanical Treatment

magnetic texture. A study of the influence of the tensile loading was made and the results are plotted in Fig 1 for various loads applied during tempering of a specimen at temperatures of 580, 600 and 620°C for thirty minutes. At each tempering temperature there is an optimum value of load which gives the greatest increase in the coercive force and some increase in the remanent induction. Further increase in the load at the given temperature reduces the remanent induction and gives a smaller increase in the coercive force. The optimum conditions for Vikaloy are tempering at 600°C for thirty minutes with the application of the tensile stress of 30 kg/mm^2. The best conditions may, however, vary somewhat from one batch to another. The conditions of treatment must be maintained very constant if alloys of consistent properties are to be produced, temperature variations should not exceed $\pm$ 2°C. The rate of heating should be strictly constant and other conditions are also mentioned. In view of these requirements an installation was constructed for the application of mechanical and

Improving the Properties of High Coercivity Alloys by Thermal-Mechanical Treatment

thermal treatment, it is illustrated diagrammatically in Fig 1 and is briefly described. The magnetic material in the form of wire is maintained under tension and an electric furnace is gradually moved along. With this equipment material can be prepared in the form of wires in lengths up to three metres with uniform coercive force and remanent induction to within ± 2%. It has been found that heat and mechanical treatment improves other alloys besides that mentioned, including alloys with vanadium contents of 8 and 14% and also iron-manganese alloys containing 15% manganese. It is to be expected that similar treatment will influence the magnetic properties of other magnetically hard alloys in a similar way. There are 2 figures and 2 Soviet references.

ASSOCIATION: Institut fiziki metallov Ural'skogo filiala Akademii nauk SSSR (Institute of Metal Physics, Ural Branch, Academy of Sciences, USSR)

SUBMITTED: April 1, 1959

18.1142

67684
SOV/126-8-4-5/22

AUTHORS: Luzhinskaya, M.G., Shur, Ya.S., and Yagovkina, N.H.

TITLE: Influence of Combined Heat and Mechanical Treatment in which Stresses are Produced by Means of Torsion of the Specimen, on the Magnetic Properties of the Vickalloy

PERIODICAL: Fizika metallov i metallovedeniye, Vol 8, Nr 4, 1959, pp 531-534 (USSR)

ABSTRACT: The authors have previously shown (Refs 1, 2) that by applying tension during the heat treatment of Fe-Co-V Vickalloy-type high-coercivity alloys, the coercive force, remanence and maximum magnetic energy in the direction of tension could be increased. It could not be found, however, which of the various possible factors produced the coercive-force increase. To settle this question the authors have now studied the influence of a different type of stress, torsional, applied during heat treatment, on the magnetic properties. The alloy composition (%) was 12 V, 52 Co, remainder Fe, specimens being in the form of wire 0.6 mm in diameter and about 100 mm long. During tempering one end was held stationary, the other was attached to the axis of a

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Influence of Combined Heat and Mechanical Treatment in which Stresses are Produced by means of Torsion of the Specimen, on the Magnetic Properties of the Vickalloy

pulley round which passed a thread holding a weight: the arrangement gave a constant torsion moment, the weight being chosen to keep the specimen twisted through the required angle. Magnetization curves and hysteresis loops were obtained by the ballistic method. Fig 1 (tempering at 600 °C for 30 min) shows that with increasing angle of twist the coercive force first rises and then falls; the remanence value only falls; the value of the magnetization at 2000 oersted (close to saturation) remains constant at low angles but falls at higher angles. Similar results were obtained with tempering temperatures of 500, 550 and 620 °C. Fig 2 shows changes in the same magnetic properties for tensile stressing of a 1 mm diameter specimen of the same composition during tempering at 575 °C for 20 minutes. The effect of tension is qualitatively similar to those of torsion on coercive force and saturation magnetization, but with tension the remanence first increases slightly before falling as the stress rises further. The authors

Influence of Combined Heat and Mechanical Treatment in which Stresses are Produced by means of Torsion of the Specimen, on the Magnetic Properties of the Vickalloy

propose a single explanation for the effects of both types of stress (Ref 1).
There are 2 figures and 3 Soviet references.

ASSOCIATION: Institut fiziki metallov AN SSSR
(Institute of Physics of Metals, Ac. Sc. USSR)

SUBMITTED: March 23, 1959

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18.1141

S/126/60/009/02/024/033
E073/E335

AUTHORS: Luzhinskaya, M.G., Fremderman, L.O. and Shur, Ya.S.

TITLE: On the Dependence of the Effect of Thermomagnetic Treatment on the Initial Properties of Permalloy

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 2, pp 300 - 302 (USSR)

ABSTRACT: In earlier work (Ref 7) A.A. Lukshin and one of the authors studied the dependence of the effect of thermomagnetic treatment on the initial characteristics of ferromagnetic alloys for the case that differences in the initial properties are due to differing purities of the material or variations in its chemical composition. The work described in this paper is devoted to the study of the relation between the effect of thermomagnetic treatment and the degree of perfection of the crystal lattice, in cases in which there is no change in the chemical composition of the material. The investigations were effected on a 66 permalloy (66% Ni, rest Fe), a material which is highly sensitive to thermomagnetic treatment. The differing degrees of distortions of the crystal lattice were obtained by

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cold drawing followed by heat treatment. Depending on the degree of preliminary deformation relaxation, partial or full recrystallization will take place, which leads to obtaining greatly differing magnetic properties (Ref 8). Specimens 150 x 5 x 0.1 mm were cut from cold-rolled strip, annealed in vacuo at 950 °C for one hour and drawn to gain residual elongations between 0 and 10%. Following that, all the specimens and also some in the as cold-rolled state were heated to 800 °C for two hours and then cooled with a speed of 100 °C/h. The H_c values for the specimen in this initial state are given in the fourth column of the table, p 301. These specimens were then subjected to thermomagnetic treatment consisting of heating to 700 °C and holding at that temprature for 30 min and cooling at the speed of 100 °C/h in a magnetic field of a potential of 300 Oe; the H_c values obtained after this thermomagnetic treatment are entered in the

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On the Dependence of the Effect of Thermomagnetic Treatment on the Initial Properties of Permalloy

fifth column of the table. After this treatment the specimens were again held at 700 °C for 30 min and cooled at a speed of 100 °C/h without the magnetic field; the resulting H_c values are entered in the sixth column of the table and it can be seen that the values are in good agreement with those obtained for specimens in the initial state (column 4), which shows that the change in the coercive force gained by the thermomagnetic treatment was due solely to the effect of the magnetic field. In the last column of the table, the ratios of the H_c values, after cooling in the absence of the magnetic field, to those obtained after cooling in the presence of the magnetic field are given; the lower the H_c values in the initial state the greater was the effect of the thermomagnetic treatment. The obtained results lead to the conclusion that the effect of the thermomagnetic treatment depends on the state of the crystal lattice of a given alloy, the degree of perfection of which is associated

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with the conditions of preliminary heat treatment; the more perfect the crystal lattice of a material, the greater will be the influence of thermomagnetic treatment on its magnetic properties. It is likely that the process of ordering progresses to a greater extent in non-deformed material and becomes the less pronounced the greater the degree of deformation of the material. It is also possible that the magnetic texture which is produced by thermomagnetic treatment manifests itself differently, depending on the background of the lattice distortions, particularly depending on the differing background of non-uniform stresses which create sections which are locally uniaxial from the magnetic point of view.
There are 1 table and 8 references, 1 of which is French, 2 English and 5 Soviet.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Metal Physics of the Ac.Sc., USSR)

SUBMITTED: September 26, 1959

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S/126/61/012/006/004/023
E193/E383

AUTHORS: Luzhinskaya, M.G., Shur, Ya.S. and Serikov, V.V.

TITLE: Specific features of the magnetic structure of Vicalloy [V-Co-Fe alloy]

PERIODICAL: Fizika metallov i metallovedeniye, v. 12, no. 6, 1961, 826 - 831

TEXT: In continuation of their earlier work (Ref. 1: FMM, 1957, 4, 54; Ref. 2: Izv.AN SSSR, ser. fiz., 1956, 21, 127; and Ref. 3: FMM, 1957, 4, 239), the present authors studied the effect of elastic stresses on the magnetic properties of Fe-8V-52Co and Fe-12V-52Co alloys, tested under conditions intermediate between magnetically soft and magnetically hard states, attained by annealing wire specimens, cold-drawn to 91% (the 12% V alloy) and 94% (the 8% V alloy) reduction at temperatures between 350 and 600 °C. The effect of such treatment on the magnetic properties of the alloys studied is demonstrated in Fig. 1, where the coercive force (H_c, Oe, lefthand scale) and residual induction ($4\pi I$, gauss, righthand scale) are plotted against the annealing temperature (°C),

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Specific features of ....

the continuous and broken curves relating, respectively, to alloys with 12 and 8% V. The effect of elastic stresses on the magnetic properties of the 12% V alloy is demonstrated in Fig. 2, where H_c (lefthand scale, lower set of curves) and $4\pi I$ (righthand scale, upper set of curves) are plotted against the applied stress (σ, kg/mm^2), Curves 1 relating to cold-worked specimens, Curves 2 - 5 to specimens annealed for 30 min at 350, 400, 450 and 500 °C, respectively. In the discussion of the results obtained the authors refer to an earlier work (Ref. 1) concerned with the effect of elastic stresses on cold-worked unannealed material. It was concluded then that the variation of H_c due to tensile elastic stresses was associated with the variation of the magnetic texture in an alloy with multidomain structure. In the case of magnetically-hard specimens (i.e. those annealed at 600 °C), the elastic tensile stresses also brought about the formation of a magnetic texture but the resultant increase in H_c could be attributed

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Specific features of ....

only to the existence of a single domain structure. The results of the present investigation indicate that in the case of Vicalloy specimens, annealed at low temperature, it is possible to produce states in which a) the single domain character of the magnetic structure is clearly revealed, b) the process of magnetization takes place mainly as a result of rotation of vectors of spontaneous magnetization intensity and c) the magnitude of H_c is small. However, an increase in the magnetic anisotropy due to externally applied stresses brings about a sharp increase in H_c. It can, therefore, be postulated that low values of H_c of specimens, annealed at low temperatures and possessing a magnetic structure approaching the single domain structure, are associated with a low degree of total magnetic anisotropy. There are 3 figures and 3 Soviet-bloc references.

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S/126/61/012/006/004/023
E193/E383

Specific features of ....

ASSOCIATION: Institut fizika metallov AN SSSR (Institute of Physics of Metals of the AS USSR)

SUBMITTED: May 5, 1961

Fig. 1:

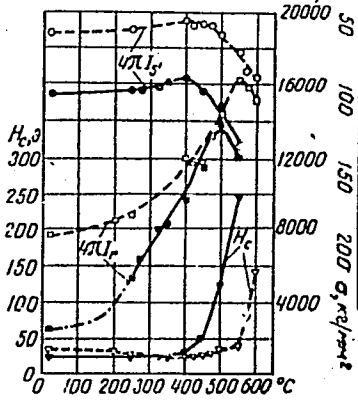
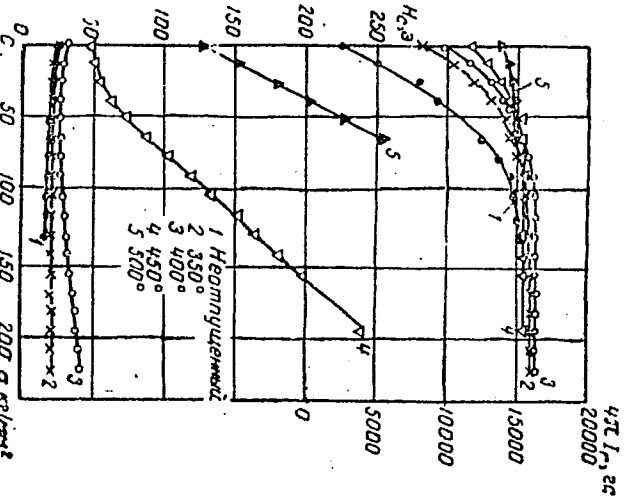


Fig.2:



Card 4/4

S/048/61/025/012/010/022
B116/B138

AUTHOR: Luzhinskaya, M. G.

TITLE: Determination of the nature of the magnetic anisotropy of alloys with a magnetic single-domain structure from the amount of their residual magnetism

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 12, 1961, 1476 - 1478

TEXT: The nature of the magnetic anisotropy of the magnet alloys Alni and Vicalloy, which have single-domain structure, has been studied by comparing the measured and calculated values for their remanence jr. The Alni specimens (25.5% Ni, 13% Al, 3.5% Cu, 59% Fe) had a coercive force of 500 oe. Measurements on 10 specimens produced a remanence of 0.5, with maximum error of 5%. This jr value corresponds to that calculated for a single-domain structure with uniaxial magnetic measurements on the Vic- alloy specimens (1-mm plates containing 12% V, 50% Co, 38% Fe, and 0.2-, 0.4-, and 0.6-mm plates containing 11% V, 52% Co, 37% Fe) were made in fields of up to 2700 oe. The coercive force H_c of the 1-mm plates was 300 oe in the rolling direction, and 300 oe transverse to it, in the

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0.2-, 0.4-, and 0.6-mm plates it was 225 - 230 oe in the rolling direction and 205 - 220 oe transverse to it. The remanence of all specimens was 0.80 - 0.84 in the rolling direction and 0.74 - 0.79 transverse to it. The results confirm that, owing to the particular form of the structural components (single domains), uniaxial magnetic anisotropy of the single-domain structure predominates in Alni. Magnetic interaction between single-domain formations hardly effects remanence. The cubic anisotropy of Vicalloy is attributed to the magnetic crystal anisotropy of the ferromagnetic phase. In highly coercive Alni both phases are ferromagnetic, but Vicalloy has a ferromagnetic and a paramagnetic phase. Magnetic interaction is therefore assumed to be absent in Vicalloy. There are 8 references: 2 Soviet and 6 non-Soviet. The reference to the English-language publication reads as follows: Nesbitt, E. A., Williams, H. J., Bozorth, R. M., Appl. Phys., 25, 1014 (1954).

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S/126/62/013/001/002/018
E073/E535

AUTHORS: Luzhinskaya, M.G. and Shur, Ya.S.

TITLE: On the nature of magnetic anisotropy in Vicalloy

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.1, 1962, 49-53

TEXT: According to theoretical conceptions, the magnetic anisotropy of single domain formations may be due to natural crystallographic anisotropy of particles of the ferromagnetic phase, anisotropy of the shape of the particles, or anisotropy of the stresses in the material. No definite data on the nature of this anisotropy in Vicalloy have so far been published. In this paper the changes in the magnetic properties of Vicalloy sheet, measured in various directions relative to the direction of rolling, as a function of the tempering temperature were investigated. The alloy used contained 12% V, 50% Co, rest Fe. The sheet was cold rolled to 1 mm thickness with a relative reduction of 86%. Furthermore, an alloy containing 11% V and 52% Co, rest Fe was used in the form of 0.6, 0.4 and 0.2 mm sheets. The specimens were in the form of strips 100 mm long, 1.5-2.0 mm wide

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and discs of 6 mm diameter. For strips cut in the direction of rolling, transverse to that direction and at an angle of 45°, the magnetization curves and the hysteresis loops were measured; on discs the coercive force H_c was measured at various angles relative to the direction of rolling. Measurements were made by a ballistic method in fields up to 2700 Oe; this field is sufficient for obtaining maximum values of residual magnetization I_r. The saturation magnetization was determined by extrapolation for an infinitely large field. Fig.1 shows the dependence of the coercive force H_c, Oe, and the relative residual magnetization $j_r = I_r/I_s$ on the tempering temperature (of 30 min duration) for 1 mm thick strips. The dots relate to values measured in the direction of rolling and the crosses to the transverse direction. There is a change in scale after the initial section of the graph. It can be seen that j_r, which is low for specimens which have not been tempered, increases sharply in the case of relatively low tempering temperatures (400°C), which is in agreement with results obtained earlier on Vicalloy wire specimens. Fig.2 shows the magnetization curve and the hysteresis loops of

On the nature of magnetic ... S/126/62/013/001/002/018
E073/E535

Vicalloy strips tempered at 600°C (dots and rings - in the direction of rolling, crosses and triangles - transverse to the direction of rolling). The following conclusions are arrived at: In the Vicalloy, states can be produced for which the magnetic structure is near to the single domain one at low H_c values. It was found that in the high coercive state the anisotropy of the magnetic properties of sheet Vicalloy is small; the value of j_r in any direction exceeds 0.5, which was calculated for the single domain structure with a single axis magnetic anisotropy. This leads to the conclusion that for Vicalloy the magnetic anisotropy of single domain formations is not along a single axis and that there is a large number of axes of easy magnetization. Apparently, anisotropy of the shape of the single domain formation or of internal stresses cannot lead to the presence of more than one axis of easy magnetization and this allows the conclusion that the cause of magnetic anisotropy in Vicalloy is the natural cubic crystallographic anisotropy, which is also responsible for the high value of H_c. There are 2 figures and 1 table.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals, AS USSR)

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S/126/62/013/002/004/019
E073/E535

18.1142

AUTHORS: Magat, L.M., Luzhinskaya, M.G. and Shur, Ya.S.

TITLE: Change in the magnetic and crystalline structure of Vicalloy during tempering

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.2, 1962, 192-198

TEXT: To elucidate the nature of the high coercive force of Vicalloy, further structure investigations combined with measurement of the basic magnetic characteristics are necessary. The authors carried out X-ray diffraction studies of the fine structure of the alloy, determining the dimensions of the mosaic blocks and the size of micro-deformations corresponding to type II stresses. In addition, the coercive force, the saturation magnetization and the residual magnetization were measured, as well as the hardness of the specimens. In the experiments an alloy containing 12% V, 52% Co, rest Fe was used. The specimens were first drawn with a large reduction so that, after a suitable heat treatment, optimum magnetic properties were obtained. The measurements were made on specimens that had been tempered within

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a wide range of temperatures (300 to 650°C). The magnetic characteristics were measured ballistically on cylindrical specimens and, after these measurements, flat specimens were cut from the cylindrical ones for X-ray analysis and hardness tests. Fig.1 shows the dependence of micro-deformations $\Delta a/a$ and of the block size D of the α-phase, the hardness H_D (kg/mm^2), the coercive force H_c (Oe) and of the quantity $4\pi I_s$, and of the residual magnetization j_r of Vicalloy on the tempering temperature, °C, for a holding time of one hour. Fig.2 gives curves of the same values as Fig.1 for a constant tempering temperature of 580°C as a function of the holding time, hours. It was found that the high coercive force H_c is associated with a certain stage of formation of the non-ferromagnetic γ-phase, which is accompanied by a change in the block dimensions and the micro-deformations of the ferromagnetic α-phase. In the high coercive state of the alloy, the dimensions of the blocks of the α-phase are of the order of hundreds of Angstrom, which corresponds to the predicted theory of the dimensions of single-domain formations. The size of the γ-phase blocks are of the same order. Comparing the

results with those of studies of the magnetic properties, the mechanism of formation of a high coercive force in Vicalloy is explained as follows. In the untempered state, the alloy has a multi-domain magnetic structure. During low temperature tempering, the γ-phase forms along the boundaries of the α-phase blocks in the form of thin interstices which constitute a barrier against displacement of the boundaries between the domains. Therefore, even for small quantities of the γ-phase, the magnetic structure will approach the single domain structure. If the tempering temperature and the quantity of γ-phase are increased, the magnetic structure becomes a single domain one due to a further splitting of the α-phase blocks by the γ-phase and to a reduction of the dimensions of the α-phase blocks. After high temperature tempering, the dispersion of the phases decreases and the conditions for the existence of a single domain magnetic structure cease to exist. Thus, the increase in H_c is due to the development of a single domain structure. Of considerable importance also is the magneto-crystalline anisotropy of the α-phase, which is small after low temperature

tempering and reaches maximum values at tempering temperatures that are higher than those which are suitable for obtaining a single domain magnetic structure. Maximum H_c values are obtained if in addition to the existence of a single domain structure, the material has a sufficiently large natural crystalline magnetic anisotropy. There are 2 figures and 1 table.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals, AS USSR)

SUBMITTED: May 5, 1961

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Changes in the magnetic and crystal structure of vicalloy during tempering. Fiz. met. i metalloved. 13 no.2:190-198 F '62. (MIRA 15:3)

1. Institut fiziki metallov AN SSSR.
(Vicalloy--Magnetic properties) (Tempering)

L 47374-65 EWP(k)/EWP(z)/EWA(c)/EWT(m)/EWP(b)/T/EWA(d)/EWP(t) Pf-4/Pad IJP(c)
MJW/JD/HW

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AUTHORS: Luzhinskaya, M. G.; Shur, Ya. S.

TITLE: Macroscopic domains in high-coercivity alloys with single-domain magnetic structure

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 3, 1965, 814-817

TOPIC TAGS: magnetic alloy, high coercivity alloy, microscopic domain, domain structure, single crystal, polycrystal/Alnico, Vicalloy

ABSTRACT: To explain the character and role of the interaction of single-domain particles in high-porosity alloys, and to investigate the domain structure whose existence is due to parallel orientations of the moments of isolated ferromagnetic regions, experiments were set up in which it was possible to take rigorous account of the magnetic anisotropy and to regulate it. To this end, the authors studied the

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domain structure in single crystals of Alnico (24% Co, 14% Ni, 8% Al, 3% Cu, remainder Fe), obtained from a polycrystalline ingot and subjected to thermomagnetic treatment, and specimens of the alloy Vicalloy (52% Co, 1.2% V, remainder Fe), which was polycrystalline. Both samples were tested under the influence of tensile stresses at the time of observation. In both cases the domain structure had the form of bands oriented at a certain angle to the axis of easy magnetization. The observed macroscopic nonuniformity of the magnetization on the surface of single crystals of Alnico in the high coercivity state was qualitatively different from the form of the domain structure of uniaxial ferromagnets with a multidomain magnetic structure. An important difference was the arrangement of the domain boundaries not along the magnetic axis but at certain angles to it. These angles decreased with increasing the total magnetic anisotropy. A qualitative model for the origin of the observed domains is proposed. Orig. art. has: 3 figures.

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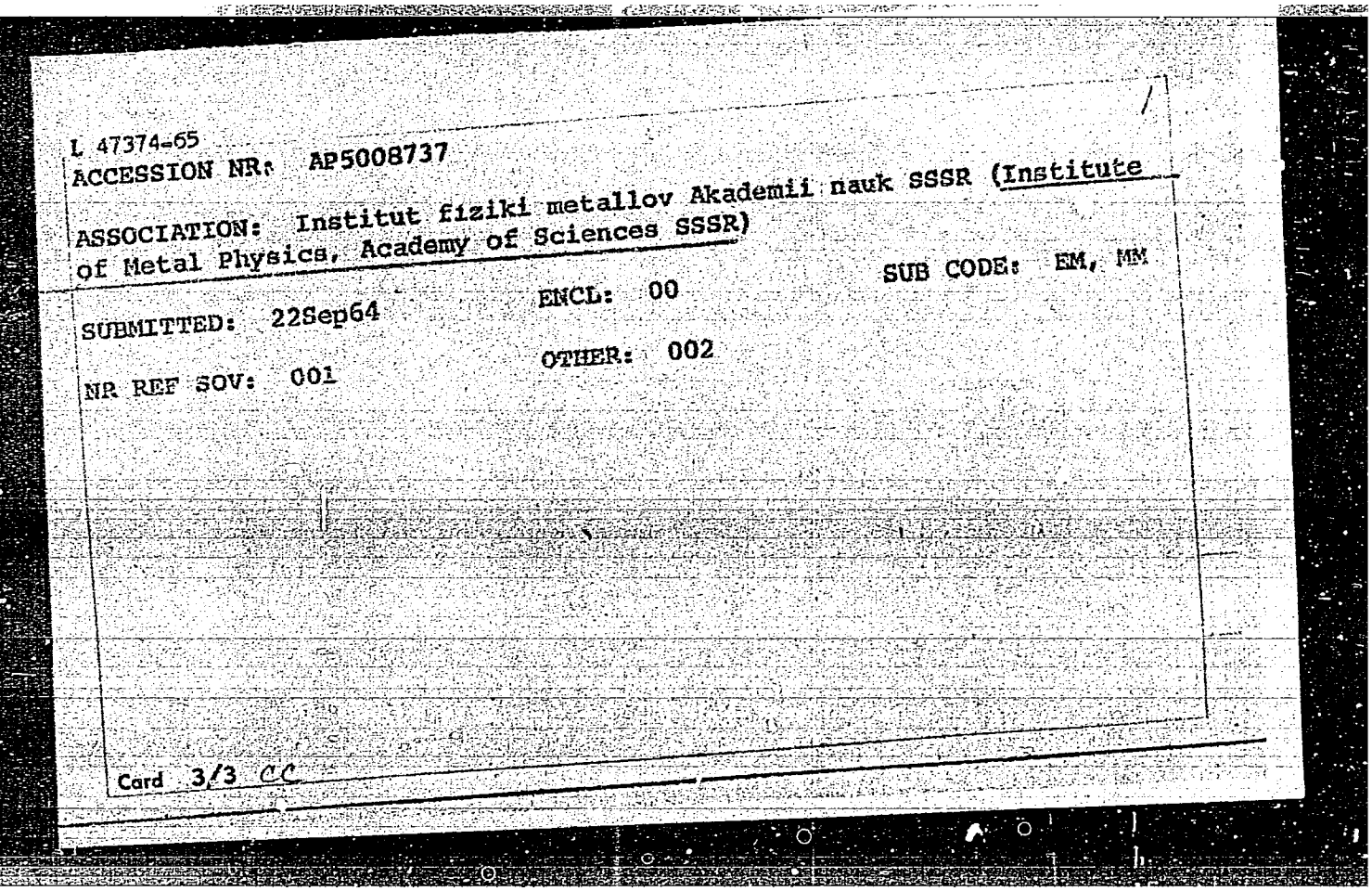

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ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Metal Physics, Academy of Sciences SSSR)

SUBMITTED: 22Sep64 ENCL: 00 SUB CODE: EM, MM

NR REF SOV: 001 OTHER: 002

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L 09758-67 EWP(m)/EWP(t)/ETI IJP(c) JD
ACC NR: AP6029125 SOURCE CODE: UR/0048/66/030/006/1022/1029

AUTHOR: Shur, Ya. S.; Luzhinskaya, M. G.

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TITLE: Domain structure of Alnico single crystals in different structural states /Report, All-Union Conference on the Physics of Ferro- and Antiferromagnetism held 2-7 July 1965 in Sverdlovsk/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 6, 1966, 1022-1029

TOPIC TAGS: ferromagnetism, iron alloy, aluminum alloy, nickel alloy, cobalt alloy, single crystal, magnetic domain structure

ABSTRACT: The authors have investigated by the powder pattern technique the domain structures of single crystal Alnico specimens, possibly of the same 51Fe-24Co-14Ni-8Al-3Cu composition that they investigated earlier (Zh. eksperim. i teor. fiz., 84, 314 (1965)). The specimens were subjected to different heat treatments, with and without the presence of external magnetic fields, which resulted in their having different coercive forces ranging from 1 to 550 Oe. The specimens were cut from single crystals of coarse-grained polycrystalline ingots or were grown by the Bridgman method, and their orientations were determined by x-ray diffraction or from the form of the

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domain structure in the tempered state. The preliminary treatments involved heating, sometimes to as high a temperature as 1300°, cooling at different rates to different temperatures with or without a 3 kOe field parallel to [100], annealing for different times at different temperatures, and/or quenching from different temperatures. Specimens that were quenched from 1300° or were cooled from 1300 to 790° in the absence of a magnetic field and then quenched showed the domain structure characteristic of cubic ferromagnets with three easy magnetization axes. Specimens with low coercive forces that were heat treated in the presence of a magnetic field exhibited domain structures that were conditions by the presence of two anisotropies; the uniaxial anisotropy induced by the thermomagnetic treatment and the natural crystallographic cubic anisotropy. Specimens with high coercive forces exhibited a type of domain structure that has not been previously observed in polydomain ferromagnets. On the planes parallel to the field H_T applied during the heat treatment there were observed bands inclined to H_T. When the magnetizing field was parallel to H_T the powder patterns on the plane perpendicular to H_T were circular (on a square specimen; when the specimen was an elongated rectangle the powder patterns were elliptical), and when the magnetizing field was inclined at 45° to H_T they were arcs of circles with their centers off the specimen. When the magnetizing field was nearly perpendicular to H_T the whole switching process could take place without the appearance of a domain structure. The authors thank L.V. Smirnov for preparing the single crystals and L.M.Magat for determining their crystallographic orientations. Orig. art. has: 8 figures.

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magnetic material 18

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Correlation between separate functions and heterophoric elements of the motor apparatus of the eye. Vest.oft. no.6:35-40 '60. (MIRA 14:11)

(EYE--MUSCLES)

LUZHINSKIY, V.K.

Pharmacology of Dianthus versicolor. Tr. Vsesoiuz. obsh. fiziol. no. 1:139 1952. (CIML 24:1)

1. Delivered 1 December 1949, Irkutsk.